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of the faculty, resigned the chair of obstetrics and was made professor emeritus of obstetrics. Dr. Paulus A. Irving, who has moved to Farmville, Va., was made emeritus professor of pediatrics. Dr. John F. Winn, formerly professor of clinical obstetrics, was elected professor of obstetrics, and Dr. Virginius Harrison associate professor of the same branch. Dr. Francis W. Upshur was chosen professor of *materia medica* and therapeutics, and Dr. C. Howard Lewis was made professor of pharmacology and also associate professor of physiology, these two physicians dividing the chair which was formerly held by Dr. Virginius Harrison. Dr. E. C. L. Miller was elected professor of bacteriology and physiologic chemistry.

MR. HARRY N. EATON, A.M. (Harvard, '06), instructor in geology in the University of Pittsburgh, has been appointed assistant professor of geology in the Pennsylvania State College.

AT a recent meeting of the Yale Corporation, Jacob Parsons Schaeffer, M.D., Ph.D., was promoted from assistant professor to be professor of anatomy in the Yale Medical School.

NATHANIEL CORTLANDT CURTIS, professor of architecture in the Alabama Polytechnic Institute, has recently been elected to the chair of architecture in Tulane University of Louisiana.

E. S. McCANDLISS, a graduate of Purdue University of the class of 1908, has been appointed instructor in civil engineering in the Missouri School of Mines.

PROFESSOR B. H. HIBBARD, of the Iowa State College, has been appointed associate professor of agricultural economics in the College of Agriculture of the University of Wisconsin.

FRANCIS E. LLOYD, for four years professor of botany in the Alabama Polytechnic Institute, and plant physiologist to the Alabama Experiment Station, has been appointed Mac- Donald professor of botany in McGill University. Professor Lloyd's address will remain unchanged till September 10 next.

DISCUSSION AND CORRESPONDENCE

THE DOME THEORY OF THE COASTAL PLAIN

TO THE EDITOR OF SCIENCE: Recently the writer's attention has been called to an article published in *SCIENCE* of April 5 by Mr. G. D. Harris in which he claims the entire credit for the discovery and promulgation of the "dome theory" of the accumulation of oil in the Gulf coastal plain. The statements in this paper are so misleading to those unfamiliar with the history of the development of this region, that the writer feels it necessary to state briefly some of the facts and to quote some of the geologists who were familiar with the early work.

The article in question is as follows:

OIL CONCENTRATION ABOUT SALT DOMES

In several national, state and private publications the writer has called attention to the remarkable concretionary growth and bodily movement upwards of huge masses of rock salt in Cenozoic deposits along the Gulf border. The bearing of the structures produced in the neighboring beds by such growths and movements on oil concentration was duly set forth in Bulletin 429 of the U. S. Geological Survey. Recently he has had the opportunity of testing the value of his "dome theory" for locating oil "pools" in a region far away from any known oil occurrences. Reference is here made to Pine Prairie, south central Louisiana, where the Myles Mineral Company has had the courage to try out the theory and has discovered by the means a new oil field. The director writes: "I consider this a most remarkable vindication of a theory originated by you, and we attribute a large measure of our success thus far to your advice."

Space should not be taken here to discuss the probable exact location of oil in connection with these domes; that is a matter depending largely on the approach of the salt domes to the surface, size, location, etc. These matters have been outlined at least in the U. S. Geological Bulletin already referred to. But the location of oil by means of a theory unheard of ten years ago does seem worthy of record at this time. Another fact that should be impressed upon the mind of the public now is the absolute worthlessness of stocks in companies putting down wells "near" the dis-

covery well. This matter has, however, been discussed in Bulletin 429.

G. D. HARRIS

CORNELL UNIVERSITY

At the risk of presenting a rather personal matter, the writer will briefly outline the history and cause of his investigations of the coastal plain region during the past eighteen years in search of deposits of mineral value. As early as 1894 he bored with diamond drills on Jefferson Island, Belle Isle, Weeks Island and Anse La Butte, La., discovering in each place a huge mass of rock salt of limited area but of great depth. At Jefferson Island pure rock salt was penetrated to a depth of twenty-one hundred (2,100) feet without finding bottom, and at Belle Isle rock salt, having a depth of twenty-seven hundred and forty (2,740) feet (pierced in 1907), was discovered with paraffine oil and large lenses of pure sulphur.¹

The successful results attained by his explorations in Louisiana led the writer to extend the study of a nascent "dome theory" into Texas and to apply it to the various phenomena occurring on Spindle Top; a low elevation of only ten to twelve feet above the surrounding prairie, and to drill finally on this dome against the advice of his friends, with the well-known result that the largest well ever discovered in the United States and variously estimated at from 75,000 to 100,000 barrels per day had its birth on the tenth day of January, 1901.

The success of this well demonstrated the possibility of attaining economic results by drilling for oil, gas and sulphur on the domes of the coastal plain. This theory held good throughout the hundreds of wells drilled around Spindle Top in the effort to extend the area laterally without results, however, for it was subsequently proved that if the original well had been located only sixty-five feet further to the northwest there would not have been a discovery well.

¹ See "Rock Salt in Louisiana," by A. F. Lucas, in *Trans. Am. Inst. Min. Eng.*, 1899, also *Jour. Ind. and Eng. Chemistry*, Vol. 4, No. 2, February, 1912.

It must be noted that this well was not located on the axis of "the central dome," hence the great risk incurred in its drilling, and whoever may claim that this dome theory does not apply, and "fools" around the rim of the dome, stands a good chance to lose himself in the quagmires of gumbos and the unconsolidated sands with which the domes are surrounded. This was proved by hundreds of wells drilled around the Spindle Top dome, not in an effort to prove a theory, but rather in the strenuous effort to extend laterally the area of the productive territory. The dome theory as advanced by the writer in the early days of the Spindle Top field to Dr. C. Willard Hayes and Professor R. T. Hill, of the U. S. Geol. Survey, to Mr. Lee Hager, consulting geologist, Houston, Texas, Dr. Wm. B. Phillips, now director of the Mineral Survey, Austin, Texas, and to Mr. Eugene Coste, of the Canadian Mining Institute, has been generally accepted.

Mr. Hager, in a letter to the writer, dated May 27, 1912, from Houston, Texas, writes as follows:

All of us down here, at least those who know the facts, are fully aware that the credit of first bringing the significance of these coastal domes to the attention of the world belongs solely to you, and I can not see that there has been any advance made upon your ideas even to this day.

Professor R. T. Hill, in the *Jour. of the Franklin Inst.*, Aug. and Oct., 1902, and in *Trans. Am. Inst. Min. Eng.*, Vol. 33, states:

Before the discovery of Spindle Top there was only one man whose ideas—although not yet co-ordinated into a theory—approximately fitted the observed conditions. Of course I refer to Captain Lucas, who, in his explorations of the Coastal Plain, seeking successively salt, sulphur and oil, had observed the associations of oil, sulphur, sulphuretted hydrogen, gas, gypsum, dolomite and salt, constituting collectively what might be termed the oil-phenomena representing a group of secondary products as distinguished from the mother-strata or sediments out of which they have been produced. Moreover, so far as I am aware, he first pointed out the existence of anticlinal hills in the Coast Prairie and their connection with the oil-phenomena. . . . Captain Lucas early noted that

sulphuretted hydrogen escaping from the earth under certain conditions deposited sulphur in crevices near the surface. Such phenomena he observed at Spindle Top before commencing his well. At High Island, Galveston County, Texas, work was temporarily suspended on a well hole and the orifice stopped with hay in order to prevent obstructions from débris. Afterwards when the plug was withdrawn the hay was found to be imbedded in a matrix of sulphur, undoubtedly deposited by the escaping gas. . . . No topographic surveys have ever been made of any portion of the Coastal Prairie, and hence the slight irregularities of its contour are discernible only with difficulty. Until Captain Lucas's investigations, certain low elevations which have since become the most important features of the landscape were hardly noticed. I allude to low swells or hills, such as Spindle Top, which occur here and there and now attract attention from their supposed relation to the occurrence of oil beneath them. . . . In the generally monotonous monoclinal structure there are a few wrinkles or small swells likely to escape the eye of even the trained observer, and yet of a character which may have an important bearing on the oil problem. These are the circular or oval mounds already described which were first recognized by Captain Lucas. When he pointed out Spindle Top hill to me, my eye could hardly detect it, for it rises by gradual slope only ten feet above the surrounding prairie plains. I was still more incredulous when he insisted that this mound, only 200 acres in extent, was an uplifted dome. But Captain Lucas said that I would be convinced of the uplift if I could see Damon's mound in Brazoria County. In August, 1901, I visited that place and then returned for a second look at Spindle Top and was convinced that if these hills are not recent quaversal uplifts no other known hypothesis will explain them.

Mr. Marius R. Campbell, a later but impartial judge, in summing up the progress that had been made,² states:

In the general wave of oil explorations and development that swept over the country from the Appalachian region, when that was at the height of its production, oil was found at Corsicana, Tex., in flat-lying rocks that were similar in geologic structure to the rocks of the mid-continent field

of Kansas, and it seems to have been generally assumed that there were no new problems in the oil fields of the Gulf coast. Captain A. F. Lucas, however, was not of this opinion. For years he had been exploring the salt beds of Louisiana, and he appears to have been the first to fully appreciate the dome structure of such deposits, and to have been imbued with the idea that they contained not only salt and sulphur but also petroleum. His famous gusher on Spindle Top near Beaumont, Texas, struck oil January 10, 1901, and fully demonstrated the correctness of his theory, although this was not generally accepted by the geologists best acquainted with the field. Some endeavored to convince the public that the conditions at Spindle Top were similar to those at Corsicana, and that the pool would be found to have considerable lateral extent, but the oil drillers soon disproved this idea, and showed that oil was practically limited to the dome and small mound which constituted its topographical expression.

There are scattered throughout the Texas Coastal Plain many well-known domes which have been prospected directly or indirectly by the writer, the most important of which are known as Saratoga, Sour Lake, Big Hill, High Island, Damon Mound, Keiser Mound, Barber Hill, Hoskins Mound, and Bryan Height. In the last-named mound the writer found in 1901 hydrogen sulphide under heavy pressure and also native sulphur which is now being heavily exploited by a New York syndicate, which hopes to make this equal to the sulphur mines of Louisiana. Whether or not this mound is also a salt dome remains to be proved by deeper drilling.

In conclusion it appears that the claim made by Mr. Harris in locating wells at Pine Prairie, as noted in his article in *SCIENCE*, quoted above, was quite premature, as *The Oil and Gas Journal*, of May 23, states:

Pine Prairie, that had promise of developing another Gulf coast field, has so far failed to produce other than disappointments. Of the five tests now drilling three are at depths considerably past that at which the Myles Mineral Company found pay in its No. 8, the discovery well, and have failed to drill into anything encouraging to test. The Producers Oil Company set screens in No. 1 Le Danois-Hudspeth at about 2,000 feet and made a try for a well, but the effort failed to be pro-

² *Economic Geology*, Vol. VI., No. 4, June, 1911.

ductive, and as a result the pipe has been pulled out, broken down and the hole abandoned.

A. F. LUCAS

WASHINGTON, D. C.,
June 3, 1912

UNIVERSITY CONTROL

LETTERS FROM YALE UNIVERSITY

It is quite unnecessary for me to speculate regarding what such a system as you propose would be. Exactly this system is in effect in New Haven. In fact Yale University consists of a collection of separate schools. Each has its own funds and almost complete autonomy. These funds are indeed held by the corporation and president, but in the main each department spends its income as its own judgment dictates with little interference from the university authorities. Each faculty nominates to the corporation its own new members, and as the corporation nearly always confirms nominations this amounts to election by the faculty. Each faculty elects its own dean who presides over its meetings. Its committees are either appointed by the dean (never by the president) or elected by the faculty itself. Such conditions fulfill almost exactly the suggestions of your pamphlet. The question is then: Does this system of university government attain the objects to which you look? I gather from your pamphlet and from previous articles of yours that the happiness of the professor is the principal object toward which you are striving. This is certainly achieved at Yale to a degree equalled, perhaps, nowhere else in America. Of course, satisfaction with one's position makes for loyalty and other incidental advantages; but is the happiness of the members of the faculty the principal object for which a university exists? Is not that form of university government best which provides the most ready adaptation of the university to the community which it serves? Ought not any form of university government to be judged by the degree of progressiveness of the institution having this government? I am inclined to believe from personal observation that in spite of all the advantages of democratic government which Yale enjoys—and which any university planned as you sug-

gest would doubtless have—a more centralized control would make for great interdepartmental cooperation and a more ready adoption of new measures than is afforded by such democratic government. After all every institution inevitably adapts itself to the views of the masters whom it serves, that is, to those from whom it obtains funds. The state universities depend upon the people of the state, the endowed universities upon their alumni. It is an article of faith with every loyal alumnus that his alma mater is perfection. With a body of "loyal" alumni viewing every change with suspicion and with a faculty thoroughly satisfied with things as they are, there would not be under the system of government which you propose any sufficient machinery for the initiation of change. There are few—if any—of the endowed universities at least which would not in my opinion benefit enormously from having a Woodrow Wilson in the presidential chair. Certainly the one institution that has enjoyed this advantage failed to reap the full benefits therefrom, because the presidency carried with it too little power and the other elements in the university too much.

There are many things in the statement which are in harmony with my own views. I have always been, and still am, a strong believer in the desirability of autonomy for the individual schools or departments of a university. To-day our universities are so large and so complex in character that it is impossible to have adequate control over all the varied interests of the university in the hands of a central body. I believe in the desirability of a corporation, or board of trustees, in whom rests final authority for all matters pertaining to the university; but I think that the initiative, the control and the general management of a department or school of the university should rest in a governing board or subcommittee, whatever you choose to call it—with a chairman or dean or director, who is given, subject to said board, a large measure of authority. The corporation of the university should be representative of all the interests of the university, so far as possible. Here at